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ABSTRACT

This document describes the development of an inventory of higher education outcome variables and measures. The intent of the inventory is to assist different kinds and levels of decisionmakers in communicating the desired and actual outcomes of instructional as well as research and public service activities. Two guidelines for using the inventory have been developed for (1) translating broad, vague goals into measurable terms and (2) developing priority lists of desired outcomes that can aid in choosing among alternative courses of action. (Author/MJM)

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AN INTRODUCTION TO THE IDENTIFICATION AND USES OF HIGHER EDUCATION OUTCOME INFORMATION

Technical Report 40

AN INTRODUCTION TO THE IDENTIFICATION AND USES OF HIGHER EDUCATION OUTCOME INFORMATION

National Center for Higher Education Management Systems at WICHE

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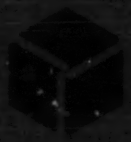

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- to increase educational opportunities for westerners,
- to expand the supply of specialized manpower in the West,
- to help universities and colleges improve both their programs and their management,
- to inform the public about the needs of higher education.

The Program of the National Center for Higher Education Management Systems at WICHE was proposed by state coordinating agencies and colleges and universities in the West to be under the aegis of the Western Interstate Commission for Higher Education. The National Center for Higher Education Management Systems at WICHE proposes as summary goals

To design, develop, and encourage the implementation of management information systems and data bases including common data elements in institutions and agencies of higher education that will:

- provide analytical information to higher education administrators at all levels,
- facilitate exchange of comparable data among institutions,
- facilitate reporting of comparable information at the state and national levels.

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HIGHER EDUCATION OUTCOME INFORMATION

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1973

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This edition of An Introduction to the Identification and Uses of Higher Education Outcome Information supersedes all previous drafts of the same title and all previous drafts of Outcomes of Higher Education (Micek and Wallhaus).

ABSTRACT

Although many difficulties are encountered in attempts to identify and use information about the outcomes of higher education, the pressures for understanding the results of higher education are such that we can no longer wait for the perfect solution; we must act now. This statement depicts the current climate in which higher education decision makers find themselves, and it sets the stage for what is discussed in this document.

Many things need to be considered in approaching the problems associated with the development and use of outcome information. One important consideration is to determine the uses to be made of the information. Will it be used for planning and management decisions, or will it be used for explaining and justifying programs and budgets? A second major consideration is to recognize that in order to understand the outcomes of higher education it is critical to take into account the different components of higher education (i.e., resources, educational processes, etc.) and their relationships to outcome measures. Another consideration is that, while research and development efforts are needed to help solve the outcomes information problem, much has been done in the way of measuring and analyzing higher education outcomes. An important step is for decision makers and researchers to get together to identify what outcome information is available and can be used, what the research and development priorities should be, and how multiple efforts to define and address the problem can be effectively coordinated.

An initial effort of the National Center for Higher Education Management Systems at WICHE has been the development of an inventory of higher education outcome variables and measures. The intent of the inventory is to assist different kinds and levels of decision makers in communicating the desired and actual outcomes of instructional as well as research and public service activities. Two guidelines for using the inventory have been developed for (1) translating broad, vague goals into measurable terms and (2) developing priority lists of desired outcomes that can aid in choosing among alternative courses of action. These guidelines and the inventory are contained in this document.

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PART I

INTRODUCTION

Will postsecondary education respond creatively to change and social trends by adapting and by influencing, or will its responses take the form of entrenchment or reprisal as a reaction to threats and crises? The question is crucial, and it is being asked today more and more frequently by observers of American higher education. The adaptability and responsiveness of our colleges and universities to the needs of individuals and society have long been the concern of planners and decision makers in higher education. Today, however, the pressures coming from outside the institution--from legislators, taxpayers, employers, parents, new applicants and others--as well as pressures being exerted from within--from students, faculty, and administrators--suggest that now more than ever before institutions of higher education need to reexamine the results and benefits of their programs from the perspective of the complex and dynamic issues confronting higher education and to plan accordingly.

While college and university planners and decision makers are well aware of the issues confronting their institutions, they are beginning to recognize that sound directions cannot be evolved by concentrating solely on historical cost data. Likewise, they are aware that the detailed analysis of demographic data and institutional resources does not provide a final answer for making decisions and laying plans that will help the institution effectively adapt and respond to the needs of students, the local community, the state, and the

nation. As a result, decision makers are recognizing that for planning to be effective, it must not only be based on information about inputs, activities, and costs, but must also be oriented to making the outcomes of higher education relevant to the present and future needs of individuals and society. In short, there has emerged an understanding of the necessity for an "outcome-oriented" approach to planning that is based on information about the results and benefits of an institution's programs rather than on information based exclusively on what goes into such programs and how those programs are operated.

While most individuals concerned with higher education recognize the need and urgency to utilize outcome information for purposes of program planning, management, and evaluation and also to support and justify long-range plans and budgets, they are quick to point out the complexity of the problem of identifying and measuring the outcomes of higher education and incorporating this information in the planning and budgeting processes.

One major difficulty is that few explicit measures of program effectiveness are currently available. Nor has much yet been done to show the links between resources and activities used and the attainment of desired outcomes even when these desired outcomes can be quantified. It is much easier to see whether a plan has been accomplished in terms of activity or resource measures (e.g., expenditures, student/faculty ratios, enrollment levels) than in terms of educational outcomes.

A second problem often cited is that even when information about outcomes is available, it is difficult to use since the techniques for analyzing and interpreting these data are largely undeveloped. For example, given all of the variables that potentially affect a particular outcome, it is virtually impossible in many instances to determine the cause-and-effect relationships. A further complexity results because many programs have joint outcomes. For example, a research project may contribute to student intellectual development in addition to producing research results.

A third major difficulty is that most planners and decision makers simply have a hard time translating their goals into terms of the specific outcomes desired. Traditionally, goal setting is one of the first steps in the planning process; however, once the goals are stated, too often they remain in general, nonoperational terms. Because the goals lack translation into specific, measurable descriptions, planners and decision makers have trouble utilizing them in selecting the optimal, or even promising, courses of action and in evaluating the implemented programs.

Finally, the use of outcome data is often thwarted by the fear of potential misuses. One aspect of this fear is that the data will not portray an accurate picture of the actual benefits derived from the institution and its programs. A second and perhaps more basic concern is uncertainty about the ultimate findings and the actions that will be taken by persons in positions of control. This latter concern is based on the fear that the evaluation

process will not adequately take into account those outcomes and benefits that are nonquantifiable and those inputs and goals that are unique to a given institution or program.

PART II

A FRAMEWORK FOR UNDERSTANDING THE USE OF HIGHER EDUCATION OUTCOME INFORMATION

The complexity of identifying, measuring, and evaluating the outcomes of higher education is obvious and overwhelming; yet, it is becoming increasingly clear that all segments of higher education must learn to deal with these problems in the near future.

Frederick E. Balderston (1970) quite accurately described the situation we now face in a paper entitled "Thinking About the Outputs of Higher Education":

> We have bumped hard into the question of outputs and their measurement because, among other things, we are seeking now to link the resources used to the results achieved--in other words, to link inputs with outputs. It turns out that in the long history of concern about the processes and activities of education, we have achieved only a very imperfect grasp of the nature of its results. Now we are having to tackle the problems of output definition and measurement under forced draft, for higher education has come to the front of public attention both as a major social problem and as a major contributor to social change and economic development.... The job we have to do is urgent, important and controversial. If we had time, we might do well to sympathize with ourselves for taking it on.

While few doubt the need, pressures, and complexities of using outcome information in laying plans, making decisions, and justifying budgets, many questions remain to be answered. For example, what outcome information is going to be utilized? For what purpose? What is the relationship between the outcomes

of higher education programs and other program measures?* What is the degree of congruence between desired outcomes and actual outcomes? What is the state of the art in college impact research and how can this be capitalized upon for short-term implementations and built upon for long-term improvements? Finally, what are the ground rules and procedures for collecting, analyzing, and utilizing outcome information?

The purposes of this section are to address these questions, to identify the knowledge and capabilities that exist, and thereby to establish a framework for utilizing outcomes in higher education planning and decision making.

The procedures one chooses for utilizing outcome information and the kinds of data and comparisons that he will need are dependent upon the use to be made of that information. While there are many purposes for focusing on outcomes, at least two can be readily identified. First, outcome information can be employed within an institution to aid the program planning, budgeting, and managing processes, or it can be exchanged with other institutions for these same purposes. Second, outcome information can be used to support and justify budgets, expenditures, and long-range plans. These processes are of major importance to funding agencies and constituents. The latter use is generating

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*Currently, NCHEMS has undertaken a project entitled Program Measures for developing categories of information that quantitatively describe programs in higher education. Collectively these information categories have been defined as "program measures" and are grouped as follows: Resource Measures (personnel, facilities, equipment), Financial Measures (revenues, expenditures), Target and Beneficiary Group Measures (those groups who are directly served and those who ultimately benefit), Activity Measures (operations), and Outcome Measures (products, events, and conditions).

much of the urgency and pressure for outcome information, but over time the first will lead to sounder directions for higher education. As a result it will provide a better response to calls to accountability by various constituencies.

To carry out these purposes, decision makers need to choose among alternatives, and therefore a process of comparison is required. The nature of this comparison, however, can be quite different if, for example, the comparison is of different programs rather than of the same program across time. Thus, another dimension to be understood in using outcome information depends on the type of comparisons that may be involved. Different bases for comparison could be appropriate for the data assembled and the procedures used. For example, institutions or agencies may compare their performance with some goal they have established, with national norms, with data from some selected groups of comparable institutions or programs, or with historical program data.

Equally important in the use of outcome information is an understanding of the different components of higher education and their relationships to outcome measures. Figure 1 presents a simplified model of higher education that shows the relationships between the major components.

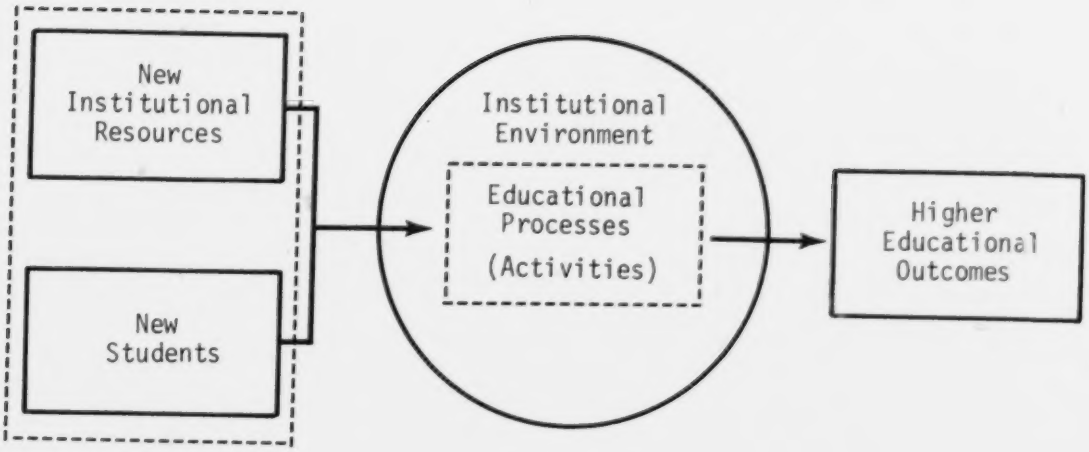

Figure 1. The Relationship Between the Major Components of Higher Education.

While the isolated effect of institutional resources, student inputs, the institutional environment, or educational processes on educational outcomes for a given time period may be relatively straightforward, all of these components are interrelated over time. This interrelationship becomes relevant in the context of planning and decision making, and it also points out the importance of using both immediate and long-term observations to gain a better understanding of measures that characterize higher education.

For example, student inputs can directly affect student outcomes, and either student inputs or institutional resources can change the institutional environment and the educational process. These changes may, in turn, affect outcomes. Introducing a special educational opportunities program by admitting and supporting underfunded students will change the socioeconomic mix and possibly the racial mix on campus. These changes will likely affect certain values and attitudes of the entire student body. Such a program may require special courses, counseling, and tutoring which may represent a change in the educational process and require a different kind and amount of institutional resources.

In addition, the impact of higher education outcomes can over time change the institutional environment. For example, certain research outcomes may eventually attract or develop a different kind of faculty and alter curricular emphasis in terms of the graduate/undergraduate ratio. Educational outcomes may also affect inputs in the future, both in terms of the resources that are made available and the kinds of students that seek admission. For example, alumni may encourage potential students to enroll or not to enroll. Impacts on job markets can affect the amount of dollars that the institution receives over time.

Educational processes carried out in one period can also affect the institutional environment in future periods. For example, changes in curricula or instructional methods may attract a different kind of student or faculty member in future time periods and cause a change in the environment of the institution.

One can easily imagine other multiple interrelationships of the major components of higher education and recognize the influence each has upon the others in a chain-reaction process over time. In short, the measurement of outcomes and the utilization of outcome data will likely be misleading if considered independent of measures of other components of higher education.

Measuring the outcomes of higher education will remain at the heart of the "outcome problem" for some time, perhaps for all time. But a good deal of research effort already has been directed toward measuring the outcomes of higher education, and it should be possible to capitalize on many of these results. (See, for example, Feldman and Newcomb, 1969.) Although it is not the purpose of this document to review comprehensively the state of the art in outcome measurement and college impact research, Table 1 attempts to capsulize the nature of the work that has been accomplished and the potentials for future research.

The first category identified in Table 1, "College Impact on Students," focuses on changes in individual student skills, abilities, and characteristics resulting from the educational experience. Most college impact research has been in this category, and much information about such outcomes as general knowledge and vocational preparation can be derived from the studies and the measures now available. These studies generally have used all or parts of the model shown in Figure 1 and employ questionnaires or test instruments to gather data on students or recent graduates over a relatively short time.

TABLE 1

COLLEGE IMPACT RESEARCH

	Focus of the Research	Outcomes Examined
COLLEGE IMPACT ON STUDENTS	-Short Time Horizons -Macro Studies -Model of Student Inputs, Environment/Process, Student Outputs -Utilizes Primarily Test and Questionnaire Data	Knowledge Skills Values and Attitudes Competence Vocational Preparation
COLLEGE IMPACT ON GRADUATES	-Long Time Horizons -Macro Studies -Historical Time Series Data (Census, etc.) -Focuses on Economic and Labor Factors	Earning Power Redistribution of Wealth Rate of Return Socioeconomic Mobility Employment Intergenerational Effects
COLLEGE IMPACT ON SOCIETY	-Medium-Range Horizons (1 to 10 years) -Macro Studies -Empirical Data from Industry, Government, Social Agencies, etc. -Focuses on Both Social and Economic Factors	GNP Factors Crime Rate Manpower Supply/Demand High Risk/High Cost Subpopulations (Welfare, Mental Health, etc.) Social Participation

The second category of studies has been called "College Impact on Graduates" (with some misgiving because the title does not adequately describe the nature of the available research of this type). Most of the work in this area has been accomplished by economists, and it has, in general, focused on the long-term and in certain cases the intergenerational effects of higher education and has typically utilized global, historical data. A number of studies have looked at the long-term earnings of college graduates, their socioeconomic mobility, etc. This research could be replicated for particular sectors and institutions of higher education and utilized in planning and management.

The third type of measurement study has somewhat arbitrarily been titled "College Impact on Society." While it can be argued that many of the so-called "College Impact on Graduates" studies in the second category have implications for society as well as individuals, attention should also be given to shorter-term effects on production, human welfare, and the other kinds of outcomes that are described in this third category of college impact research. Such studies would undoubtedly involve shorter time horizons and would draw upon data from employers, social agencies, and various other sources.

Certain characteristics and future research requirements are common to all three impact areas. First, because of rapid changes in higher education, impact research must be continuous. Changes in higher education over time can easily invalidate relationships that were uncovered years earlier. Also, many of the measurements and relationships are remote in terms of time. A

change in the educational process may precede by a number of years a corresponding change in a resulting outcome measure. The same may be true of resource measures and environmental measures.

Thus, many outcomes of higher education can be thought of as investments; that is, some value--an increase in knowledge, for example--is added over time. Other outcomes are more like consumer goods and are evaluated in terms of immediate reactions, like satisfaction gained by some new discovery or the joy of learning. These differences obviously imply the need for different measurement methodologies. Perhaps sets of measures can be combined into indices similar to the Gross National Product, the Dow Jones Average, and the Cost-of-Living Index. Such indices have important meaning for investors, economists, and governmental policy makers. The same could be true for higher education in the future by employing these kinds of approaches.

Many difficulties and dilemmas compound the problem of measuring the outcomes of higher education. Most of these difficulties, however, center around interpretations of outcome measures. It is often confounding to attribute given outcomes to specific courses. For example, suppose a significant relationship is found between the number of credits taken in elective courses and the vocational advancement of graduates a number of years later. This observation is difficult to interpret. Did the elective courses make the difference, or was some characteristic of students who take elective courses--such as a broad scope of interests--really the causal factor? Systematic research should ease the problem created by too many variables and interrelation-

ships to identify and study. Perhaps a critical path through the maze can be defined and carried out in a well-coordinated effort.

The need and urgency to begin internalizing and implementing outcome-oriented approaches have come down hard upon higher education, even though there are high risks and danger of damaging misuse of the meager information that is available. While our knowledge is incomplete and imperfect, it should not be underestimated. It is unrealistic to insist upon the ability to measure quantitatively all the results and benefits of higher education before taking the first step down the road in the direction of outcome-oriented planning and management. The nature of these problems indicates that a long-term, large-scale effort is the prospectus for a program in the area of the outcomes of higher education. Such a program needs to accomplish:

1. The development of better outcome measures, and the identification of relationships between these measures. (This is primarily a research problem involving specific measurement studies and improving measurement technologies.)

2. The establishment of linkages between outcome measures and other measures of the components of higher education.

3. Continual improvement of the conceptualization and understanding of the outcomes assessment problem in higher education.

4. The development of a taxonomy of higher education outcome variables that identifies and defines the associated outcome measures that are currently available. (This product must have a very pragmatic orientation.)

5. The development of guidelines and procedures for utilizing outcome measures and assessment methodologies that have short-term payoffs and can be built upon for longer-term improvements.

6. Finally, the promotion of the use of outcome information in the planning and management processes in all sectors and levels of higher education.

Achievement of these results will require considerable resources over a long period of time and will involve parallel activities in research, implementation, and coordination. These achievements will be accomplished only if the decision makers and policy setters on the firing line take the lead by giving direction and coordination to the overall effort.

PART III

THE INVENTORY OF HIGHER EDUCATION OUTCOME VARIABLES AND MEASURES: AN OVERVIEW

The Outcomes of Higher Education project of the National Center for Higher Education Magagement Systems at WICHE hopes to make significant contributions to solving the problems associated with identifying and using outcome information in planning and management. NCHEMS's first effort has been an attempt to develop an inventory of possible outcome variables with suggestions for their measurement. The sections that follow describe the inventory and its use.

Development of the Inventory

One major problem associated with incorporating the outcomes of higher education into planning and decision making processes has been the lack of a "common outcomes language" necessary for communicating and understanding the outcomes and benefits of higher education programs. To some degree this situation parallels the difficulties biologists faced prior to the development of Linnaeus's taxonomy, which provided a common language or inventory for identifying and categorizing the various hierarchies of living organisms. Once the taxonomy was completed, however, biologists were in a better position to identify, measure, and analyze the characteristics and changes of the various species. Consequently, their knowledge about plant and animal organisms increased, and their communication about these organisms with other scientists improved.

Similarly, higher education has difficulty communicating about benefits or results. Barriers are encountered when attempts are made to translate goal statements into terms of program outcomes, and program comparisons are thwarted because structures, definitions, and measures are lacking. While developing a communication base for higher education outcomes is by no means a total or final solution, it is a necessary step. Recognition of the potential benefits of such a communication base has led NCHEMS to develop the Inventory of Higher Education Outcome Variables and Measures. This inventory lists and describes various outcomes of higher education and suggests potential measures or proxy measures of those outcomes.*

Basic to the inventory are two criteria. The first criterion is that the inventories must be of service to as many kinds and levels of planners and decision makers in higher education as possible. For example, they should aid students and parents in making better decisions about which

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*NCHEMS has also developed an Inventory of Institutional Environment Variables and Measures that includes various combinations of resource measures, financial measures, activity measures, and target and beneficiary group measures. The development of this inventory recognizes that institutions do design programs and allocate resources to produce certain important environmental outcomes. For example, institutions of higher education create programs and allocate resources to develop certain types of facilities that will promote a unique intellectual and/or social atmosphere. While the creation of this unique atmosphere may be a desired outcome, it is pursued with the belief that it will eventually contribute to better student learning, better research, or better service for the students and the community in general. In addition, environmental measures can be utilized as meaningful proxies for outcomes, if the outcomes cannot be measured directly. For example, the number of library volumes acquired per student may serve as a proxy measure of student growth and development.

For your information, drafts of this inventory are available on request.

institutions and programs will provide the most meaningful and appropriate educational experiences. They should help institutional administrators and program managers account for the educational resources allocated and utilized in terms of the outcomes and benefits produced and the goals attained. Finally, they should provide legislators and statewide coordinating agencies with a better understanding of the intended as well as the unintended consequences of higher education.

The second criterion employed in developing the inventory is that it must provide a relatively complete characterization of an institution's programs. The variables listed in the outcomes inventory should include not only academic and instructional outcomes, but research and community service outcomes as well.

The inventory has been developed to include comprehensive lists of the outcome variables related to higher education programs and institutions. For the purpose of clarification, a variable in the context of the inventory is defined as some entity or quality capable of assuming one of a number of quantitative or qualitative values. For each outcome variable the inventory presents a definition and/or pertinent description, and it suggests a list of potential measures that can provide the appropriate evidence or necessary data for assessing the designated variables.

The current outcomes inventory incorporates reactions and suggestions from many individuals concerned with higher education. The following major categories define the structure of the inventory.

Section 1.0: Student Growth and Development Outcome Variables

1.1.0: Knowledge and Skills Development

1.2.0: Social Development

1.3.0: Personal Development

1.4.0: Career Development

Section 2.0: Development of New Knowledge and Art Forms Outcome Variables

Section 3.0: Community Development and Service Outcome Variables

3.1.0: Community Development

3.2.0: Community Service

3.3.0: Longer Term Community Effects

Characteristics of the Inventory

The outcomes inventory can be further described by identifying certain key characteristics and limitations.

Comprehensiveness: While every attempt has been made to develop a comprehensive list of variables, it is highly probable that certain important outcome variables have been overlooked. Or, more likely, in certain cases the descriptions may be interpreted to exclude elements that they are intended to encompass.

It is also recognized that different individuals, institutions, and agencies will establish different subsets of the variables they view as relevant. Such lists will undoubtedly eliminate

certain variables, which will simply emphasize the fact that different individuals, institutions, and agencies have unique sets of objectives.

Disaggregation: If an attempt is made to map the inventory onto an institution's program structure, it may become apparent that incongruities exist at different levels of aggregation. For example, it is very difficult to associate many of the outcome variables, particularly those in the area of student values and attitudes, with any program classification below the entire campus except on a very arbitrary basis. A major reason for this aggregation problem is that higher education programs often produce joint outcomes. For example, a program in political science potentially affects students in terms of their "political" values and attitudes. Similarly, a program in history and sociology can also affect "political" values and attitudes. Consequently, attributing any change in students' "political" values and attitudes to a particular program or course is extremely difficult.

Redundancy: While developing a list of mutually exclusive outcome variables has been a key concern in the development of the inventory, the overlaps between variables in the inventory have not been entirely eliminated. For example, student values and attitudes toward "change and stability" are likely to intersect with "political" values and attitudes. Similarly, "vocational

preparation" characteristically intersects with "general knowledge" and "communication skills."

Neutral Scale: The variables' definitions and/or descriptions are not intended to connote value judgments. Efforts have been made to eliminate the use of such value-laden terms as "increase," "gain," and "benefit." Each user of the inventory is expected to view the variable descriptions as a neutral scale, to which he can attach his own unique values in terms of his preferred evaluation standards or his desired levels of performance. For example, one institution may want to increase the importance its students attach to "socioeconomic aspirations," while another institution may desire to decrease the degree of emphasis placed on this variable. It is also recognized that an implied value judgment is built into the inventory by virtue of the level of aggregation utilized. That is, since "communication skill" is listed and mathematical skill is not, the unintended implication may be that communication is more important than mathematics. However, every attempt has been made to maintain a consistent level of aggregation throughout the inventory.

Measures: Developing a comprehensive list of outcome measures is a large scale task, and it should be clear that the suggested measures are not all-inclusive or, for that matter, they may not be the best available. Thus, each user of the inventory

should strive to identify or develop additional measures or proxy measures to gain as much information as possible about the outcome variables he is interested in assessing. The criteria for suggesting measures are based on judgments of their significance and practicality, primarily relative to data availability. Studies to determine the relationships between measures and their value, practicality, and interpretation remain to be accomplished.

PART IV

USING THE INVENTORY

Outcomes can be an integral part of higher educational planning and decision making, even though in many cases information is incomplete or quantitative measures are not available. The following general suggestions for using the outcomes inventory are presented with this belief in mind.

Translating Goals into Measurable Terms

The major shortcoming of most goal statements--that they are nonoperational and unmeasurable--could be alleviated through the structure and definitions provided in the inventory and the application of the following guidelines:

Guideline 1: Identifying the Desired Outcomes. The first task in translating goals into operational, measurable terms should begin by answering the following question for each goal: "Which outcome variables in the inventory are representative of the goal statement?" Consider the following goal:

"To develop the career potential of each student."

Clearly, this statement does not offer much information about specific outcomes or benefits that should result from programs implemented to attain it. Through the use of the outcomes inventory, however, the

following "Student Growth and Development" outcome variables could be identified as reflecting the actual meaning of the goal:

"To develop the career potential of each student."

- General Knowledge
- Knowledge in Specialized Fields
- Application of Knowledge
- Vocational Preparation

Obviously, there is a good chance for disagreement with this list of outcomes because it does not contain all of the outcomes related to the goal, or one might argue that other outcome variables in the inventory define the goal better. Since a prerequisite of the goal translation process is to identify a set of outcome variables for each statement that is as close as possible to consensus, some method that allows a pooling of individual judgments should be used. For example, survey techniques such as the DELPHI method (Uhl, 1971) or the Q-sort technique (Stephenson, 1953) could be useful.*

Guideline 2: Identifying the Outcome Measures. The next task in translating goal statements is establishing the means for quantifying the outcome variables. For each of the outcome variables, measures

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*These techniques are designed to help in reaching consensus among persons who may have differences of opinion about some subject.

that will provide quantitative information necessary for evaluating the outcome should be selected from the inventory. If a representative outcome measure cannot be identified in the inventory, then it may be possible to substitute some other proxy measure.

As Figure 2 shows, a master outcome list for a single goal includes a number of different levels of specificity.

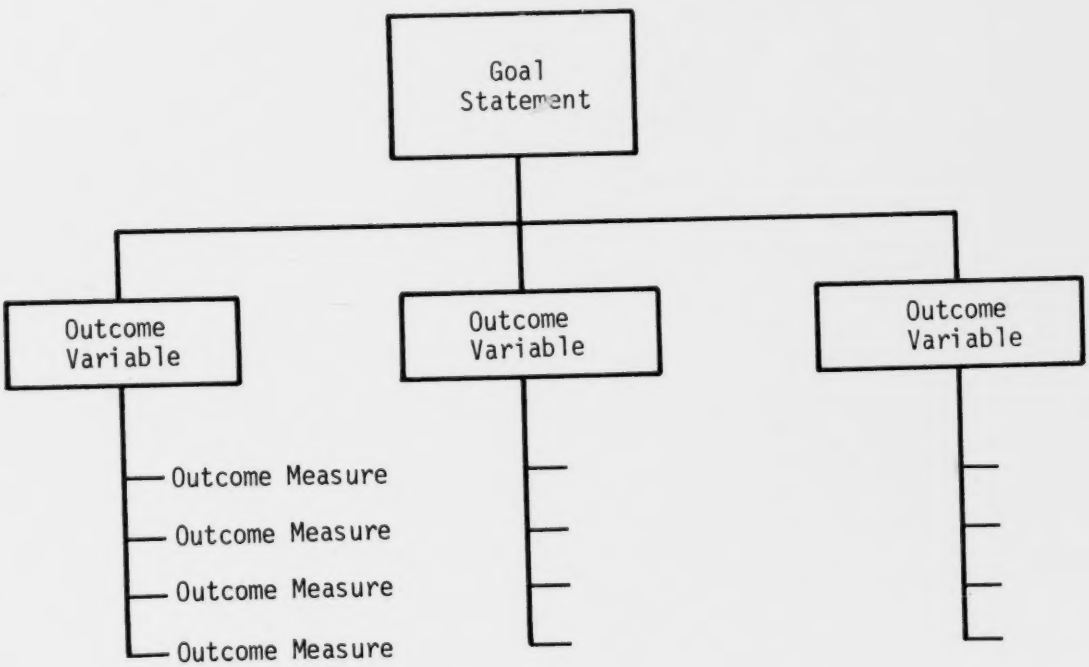

Figure 2. A Diagram of the Levels of Outcome Specificity.

The primary potential misuse of the inventory at this step is the tendency to attach an inappropriately larger importance to those variables that are easiest to measure. Hartnett (1971, p. 13) points out that "such a situation is much like that of the proverbial tail wagging the dog." It is important to recognize that certain consequences of higher education probably are not measurable and perhaps never will be. The following points need to be considered when outcome measures are selected:

Will the measure be valid? Unless the measure is judged to be representative of the outcome being measured, it will have little meaning to those who are using the data to make a decision.

How reliable is the measure? The consistency and reproducibility of a measure should always be considered to guard against variance due to random error.

Where will the data come from? A measure will be of little use if no feasible data source is available or if appropriate data collection instruments and methodologies are lacking.

How much time will it take to implement the measure? The time frame required to use a particular measurement technique should be considered in terms of feasibility and timeliness.

How much will a particular measure cost? While certain types of data are desirable for evaluating programs, the costs of collecting those data must be analyzed at the outset.

Will the measure constitute an "invasion of privacy"? Although certain measures are quite satisfactory for the purpose intended, they cannot be utilized if individuals or groups cannot be asked to supply the data needed or if they refuse to supply it.

In summary, before implementing any measure, the adequacy of that measure (i.e., its relevance, reliability, validity, and ease of administration) should be well established. Every attempt has been made to apply these criteria in suggesting the measures listed in the inventory.

Guideline 3: Determining the Basis for Comparison. The next step in translating goals involves identifying the evaluation criteria or bases against which comparisons can be made between actual and desired outcomes. Generally, there are three types of comparison that can be utilized. First, an actual outcome can be compared to some "absolute" standard or goal that has been set for the specific level or degree of performance to be achieved. Such standards usually specify the particular minimum and/or maximum levels of performance to be achieved. It is also possible to use a historical outcomes data base as a basis for comparison. Often it is of interest to know how some program has done relative to past performance. This means establishing a data base that can be maintained and utilized for making evaluations over designated periods of time. A third possibility is to use the performance of the comparable programs or the achievement of other groups of students as the basis for comparison.

Establishing a basis for comparison involves determining the "best test for success" relative to each desired outcome. Quite naturally these decisions provide the potential for great conflict. The outcomes inventory provides only indirect assistance in this area, since by design the outcome variables and measures are intented to be "neutral" in nature.

However, in identifying the bases for comparison against which evaluative judgments can be made, the following points should be kept in mind:

- The basis for comparison should be consistently and accurately measurable.
- The basis for comparison should relate to the specific situation in focus. It should be valid.
- The basis for comparison should be updated as dictated by the dynamics of the higher education environment.
- The basis for comparison should be acceptable to the groups affected by the comparison; again, consensus is important.

To facilitate the goal translation process, a "goal translation recording form" similar to Table 2 would be helpful. This table illustrates how an outcome variable such as "vocational preparation" might be analyzed. The following measurement-specific statements of desired outcomes have been transcribed from the information shown in the table:

TABLE 2

GOAL TRANSLATION RECORDING FORM

PROGRAM: Mechanical Engineering

GOAL STATEMENT: "To develop the career potential of each student."

Outcome Variables	Outcome Measures	Basis for Comparison
Vocational Preparation	- Percentage of graduates (who wish jobs) receiving job offers.	- Within 90 days after graduation 90% of the Micro U grads will receive firm offers.
	- Percentage of graduates (who wish jobs) receiving job offers.	- Within 90 days after graduation a greater percentage of Micro U grads will receive offers than Macro U grads.
	- Percentage of graduates in management positions.	- Class of '65, 5 years after graduation, will have 5% more grads in management positions, than class of '64, 5 years after graduation.

- The Mechanical Engineering program at Micro U will demonstrate effectiveness in its vocational preparation of students as evidenced by 90 percent of the program's graduates being employed within 90 days after graduation. (A comparison based on an "absolute" standard or goal.)

- The Mechanical Engineering program at Micro U will demonstrate effectiveness in its vocational preparation of students as evidenced by the average number of job offers of graduates being at least as great as the average first salaries of Mechanical Engineering graduates at Macro U. (A comparison based on the performance of another program.)

- The Mechanical Engineering program at Micro U will demonstrate effectiveness in its vocational preparation of students as evidenced by the class of 1965 achieving 5% more management positions five years after graduation than the class of 1964 five years after graduation. (A comparison based on historical data.)

In practice these desired outcome statements would deserve further qualification; however, they are illustrative of the type of measurable goal statements necessary for effective outcome-oriented planning and decision making. The major advantages of such statements are:

- They clearly communicate in measurable program outcome terms what is desired.

- They are much easier to compare because they are in the same language as the actual outcomes of programs, and the basis for comparison is explicitly stated.

- They help identify the kind of measuring instruments to utilize for data collection.

Developing a Priority List of Outcomes

"Which alternative program is most likely to give us the most return for our money and effort?" As is often the case, no one program alternative can be expected to satisfy all of the desired outcomes. As a result, in selecting programs and allocating resources, planners should constantly refer to the relative value of the desired outcomes spelled out in a "priority list" of outcomes.

Guideline 1: Developing a Priority List of Desired Outcomes. Programs produce multiple outcomes, and different programs result in different kinds and levels of outcomes. Programmatic decisions must focus on the differences between various alternatives in terms of their importance relative to each other. As a result, the following points should be considered:

- Once the outcome variables and measures have been identified, they should be ranked in order of importance or they should be assigned quantitative weights to reflect their relative values.

- Since different decision makers may value the outcomes quite differently, the techniques for reaching consensus again should be employed.

Guideline 2: Applying the Priority List of Outcomes. Once constructed, the ranked or weighted priority list of outcomes can be used as a "yardstick" to evaluate the expected outcomes of the programs being considered. The end result will be an estimate of the benefits to be derived from the various program alternatives being analyzed. The example in Table 3 illustrates how such a priority list of desired outcomes could be applied in program selection.

TABLE 3
A COMPARISON OF THREE ALTERNATIVE PROGRAMS
USING A LIST OF RANKED DESIRED OUTCOMES

Ranked Desired Outcome	Expected Outcomes of Program Alternatives		
	A_1	A_2	A_3
1 - Vocational Preparation	0	+	+
2 - Application of Knowledge	+	+	+
3 - General Knowledge	+	0	+
4 - Political Attitudes	0	+	0

(+) = outcome expected; (0) = outcome not expected

As the information in the table indicates, alternative A_3 will produce the most benefits. However, if the cost of implementing alternative A_2 is half the expected cost of alternative A_3, then a decision will have to be made concerning whether the outcome, "general knowledge," is worth the difference. Although this example is greatly oversimplified, it does suggest the process involved.

In Conclusion

The few guidelines that have been presented are admittedly subjective, and in many instances will be difficult to apply systematically. As a result, many individuals will say that until the outcomes inventory and the guidelines are fully developed and we know all there is to know about their use and consequences, no attempts should be made to employ them in laying plans and making decisions. While NCHEMS is sensitive to the need for much caution, it also is aware that many other individuals are saying, "We recognize the potential limitations and misuses, but we cannot wait; we must act now." Consequently, as the inventory and the guidelines are examined and as efforts are applied to implement them, this experience will be utilized to improve the inventory and to develop more definitive guidelines for its use. It is, therefore, important that the planners and decision makers in higher education take the lead in this effort by effectively collecting and utilizing the outcome data that are available and feeding back the results of these experiences to focus additional research.

In support of this effort, the NCHEMS Outcomes of Higher Education project has two objectives in mind: First, to coordinate a well-planned research effort so the problems associated with the inventory and with the use of outcome data in higher education planning and decision making will be better understood and, second, to meet the immediate needs of higher education by synthesizing and testing procedures and measures and making these available as soon as possible.

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APPENDIX

INVENTORY OF HIGHER EDUCATION OUTCOME VARIABLES AND MEASURES

OUTLINE OF THE INVENTORY OF OUTCOME

VARIABLES AND MEASURES

1.0 Student Growth and Development

- 1.1.0 Knowledge and Skills Development
  - 1.1.1.00 Knowledge Development
    - 1.1.1.01 General Knowledge
    - 1.1.1.02 Specialized Knowledge
  - 1.1.2.00 Skills Development
    - 1.1.2.01 Application of Knowledge Skills
    - 1.1.2.02 Critical Thinking and Reasoning Skills
    - 1.1.2.03 Creativity Skills
    - 1.1.2.04 Communication Skills
    - 1.1.2.05 Motor Skills
  - 1.1.3.00 Knowledge and Skills Attitudes, Values, and Beliefs
    - 1.1.3.01 Intellectual Disposition

- 1.2.0 Social Development
  - 1.2.1.00 Social Skills
    - 1.2.1.01 Interpersonal Participation
    - 1.2.1.02 Leadership
    - 1.2.1.03 Citizenship
  - 1.2.2.00 Social Attitudes, Values, and Beliefs
    - 1.2.2.01 Political
    - 1.2.2.02 Racial/Ethnic
    - 1.2.2.03 Personal Ethics

1.2.2.04 Social Conscience

1.2.2.05 Socioeconomic Aspirations

1.2.2.06 Cultural Interest

1.3.0 Personal Development

1.3.1.00 Student Health

1.3.1.01 Physical Health

1.3.1.02 Mental Health

1.3.2.00 Student Personal Attitudes, Values, and Beliefs

1.3.2.01 Religious and Spiritual

1.3.2.02 Change/Stability

1.3.2.03 Self-Concept

1.4.0 Career Development

1.4.1.00 Career Preparation

1.4.1.01 Academic Preparation

1.4.1.02 Vocational Preparation

1.4.2.00 Career Attitudes, Values, and Beliefs

1.4.2.01 Achievement Orientation

1.4.2.02 Educational Aspirations

1.4.2.03 Educational Satisfaction

1.4.2.04 Vocational Aspirations

2.0 Development of New Knowledge and Art Forms

- 2.0.0.01 Discovery of New Knowledge
- 2.0.0.02 Interpretation and Application of New Knowledge
- 2.0.0.03 Reorganization of New Knowledge

3.0 Community Development and Service

- 3.1.0 Community Development
  - 3.1.0.01 Community Educational Development
  - 3.1.0.02 Faculty/Staff Educational Development
- 3.2.0 Community Service
  - 3.2.0.01 Extension Services
  - 3.2.0.02 Personal Services
  - 3.2.0.03 Extramural Cultural and Recreational Services
  - 3.2.0.04 Financial Impact on the Community
- 3.3.0 Longer Term Community Effects
  - 3.3.0.01 Social Impact
  - 3.3.0.02 Economic Impact

OUTCOME VARIABLES	POTENTIAL MEASURES
1.0 Student Growth and Development 1.1.0 Knowledge and Skills Development 1.1.1.00 Knowledge Development 1.1.1.01 General Knowledge The familiarity with and understanding of facts and principles across several broad fields. The student's breadth of knowledge.	Note: Many of the measures listed in 1.4.0 Career Development may also apply in 1.1.0. 1.1.1.01 General Knowledge Measures - Average student score on those items from tests (e.g., CLEP - General Exam; SAT Area Exam) that measure breadth of knowledge.* - Average student change in breadth of knowledge as determined by comparing entering general knowledge test scores to subsequent test scores (e.g., on CLEP, the GRE or SAT Area Exams) after ____ years. - Average student-reported score on a scale measuring degree of satisfaction with breadth of knowledge (based on a student survey).

*Standardized measures are referenced at the end of this inventory.

OUTCOME VARIABLES	POTENTIAL MEASURES
1.1.1.02 Specialized Knowledge The familiarity with and understanding of facts and principles in the particular fields in which the student elects to study. The student's depth of knowledge.	1.1.1.02 Specialized Knowledge Measures - Average student score on those items from tests (e.g., CLEP Subject Exams, or GRE Area Exams) that measure depth of knowledge in special fields of study. - Average student change in depth of knowledge by discipline area as determined by comparing entering specialized knowledge test scores to subsequent test scores (e.g., on CLEP Subject Exams or GRE Area Exams) after ____ years. - Number of graduates accepting employment in their major field of study as a percentage of total graduates in that field. - Number of students passing certification or licensing exams (e.g., bar exam, CPA) on first attempt as a percentage of all students taking the exam. - Average student-reported score on scale measuring the degree of satisfaction with their knowledge gain in specialized fields of study (based on a student survey). - Number of graduates accepted for study in post-baccalaureate degree programs as a percentage of those applying.

OUTCOME VARIABLES	POTENTIAL MEASURES
1.1.2.00 Skill Development	
1.1.2.01 Application of Knowledge Skills The ability to relate relevant general or specialized knowledge to a problem and to implement a solution. Also, the ability to locate, retain, and filter relevant knowledge.	1.1.2.01 Application of Knowledge Skills Measures - Average student score on those items from tests (e.g., CLEP Subject Exams, GRE or SAT Area Exams, or the OPI-Thinking Intro-version Scale) that measure ability to apply general or specialized knowledge. - Average student change in ability to apply knowledge as determined by comparing entering ability test scores to subsequent test scores (e.g., on CLEP Subject Exams, the GRE or SAT Area Exams) after ____ years. - Average student- and/or former student-reported score on a scale measuring degree of satisfaction with their ability to apply what they know both in breadth and depth (based on a student and/or former student survey).
1.1.2.02 Critical Thinking and Reasoning Skills The ability to formulate and analyze problems and to employ rational processes to achieve increased understanding (e.g., the recognition of biased points of view in a speech or a book; the recognition of cause-and-effect relationships).	1.1.2.02 Critical Thinking and Reasoning Skills Measures - Average student score on tests (e.g., OPI-Theoretical Scale; KIT-Critical Thinking Index, Critical Thinking Orientation Scale, or Critical Thinking Benefits Scale; AVL-Theoretical Scale) that measure ability to formulate and analyze problems. - Average student change in ability to formulate and analyze problems as determined by comparing entering critical thinking ability scores on tests (e.g., OPI-Theoretical Scale; KIT-Critical Thinking Index, Critical Thinking Orientation Scale, or Critical Thinking Benefits Scale; AVL-Theoretical Scale) to subsequent test scores after ____ years.

OUTCOME VARIABLES	POTENTIAL MEASURES
1.1.2.03 Creativity Skills The ability to design, produce, or otherwise bring into existence original perspectives, explanations, and implementations (e.g., the production of unique communication; the development of an effective plan or solution to a problem; or the creation of works of art).	- Average student-reported score on scale measuring degree of satisfaction with their ability to apply what they know both in breadth and depth (based on a student survey). - Percentage of courses taken that are classified as emphasizing critical thinking and reasoning. 1.1.2.03 Creativity Skills Measures - Average student score on tests (e.g., OPI-Complexity of Outlook Scale; KIT-Art Scale, Music Scale, Literature Scale, or Drama Scale; AVL-Aesthetic Scale) that measure the ability to create original perspectives, explanations, and implementations. - Average student change in ability to create original perspectives, explanations, and implementations as determined by comparing entering creative ability scores on tests (e.g., OPI-Complexity of Outlook Scale; KIT-Art Scale, Music Scale, Literature Scale, or Drama Scale; AVL-Aesthetic Scale) to subsequent test scores after ____ years. - Average student-reported score on a scale measuring degree of satisfaction with their ability to create original perspectives, explanations, and implementations (based on a student survey).

OUTCOME VARIABLES	POTENTIAL MEASURES
	- Percentage of courses taken that are classified as emphasizing creativity. - Number of patents awarded/copyrights obtained by former students within the past ____ years (based on a former student survey).
1.1.2.04 Communication Skills The ability or competence to read, write, speak, and listen. The ability to convey information, attitudes, emotions, etc.; and also the ability to receive and interpret communications. These skills also encompass nonoral, nonwritten expression and perception.	1.1.2.04 Communication Skills Measures - Average student score on tests that measure the ability to communicate. - Average student change in ability to communicate as determined by comparing entering scores on tests of communicative ability to subsequent test scores after ____ years. - Percentage of courses taken that are classified as emphasizing communication skills. - Number of students participating in debate, encounter groups, etc., as a percentage of all students.
1.1.2.05 Motor Skills The ability or competence in tasks requiring physical dexterity and skill.	1.1.2.05 Motor Skills Measures - Average student score tests that measure motor skills. - Average student change in motor skills as determined by comparing entering skill test scores to subsequent test scores after ____ years. - Number of students participating in intramural and varsity athletics as a percentage of all students. - Percentage of courses taken that are classified as emphasizing motor skills.

OUTCOME VARIABLES	POTENTIAL MEASURES
1.1.3.00 Knowledge and Skills Attitudes, Values, and Beliefs	
1.1.3.01 Intellectual Disposition The desire to continue self-initiated study and inquiry for its own sake and/or for personal enjoyment.	1.1.3.01 Intellectual Disposition Measures - Average student change in perception and evaluation of their interest in continued self-initiated study and inquiry as determined by comparing entering test scores on (e.g., AVL-Intellectual Scale; KIT-Intellectual Orientation Scale; SAI-Understanding Scale) to subsequent test scores after ____ years. - Percentage of students taking noncredit, independent study, or special courses. - Average student-reported score on a scale measuring their evaluation and perception of the amount of learning that took place outside of formal instruction (based on a student survey). - Number of books, records, tapes, and other library materials checked out per student over a specified period of time.
1.2.0 Social Development	
1.2.1.00 Social Skills	
1.2.1.01 Interpersonal Participation The ability to live and interact with others. This variable may be further disaggregated into such categories as cooperation, friendly companionship, and organizational skills; the ability to handle stress, isolation, and bias.	1.2.1.01 Interpersonal Participation Measures - Average number of memberships per student and/or former student in social, charitable, political, or civic organizations (based on a student and/or former student surveys).

OUTCOME VARIABLES	POTENTIAL MEASURES
	- Average number of awards and citations earned per student and/or former student for social contributions (based on a student and/or former student survey). - Student and/or former student perceptions and evaluations of their interpersonal participation as determined by selected measures (e.g., AVL-Social Scale; CUES-Community Scale; F-Scale; KIT-Interpersonal Index; Learning: Experiential Scale and Feeling About Other People Scale; ISS-Social Subscale of Institutional Goals Section). - Average number of friends and acquaintances reported per student (based on a student survey).
1.2.1.02 Leadership The ability to establish directions or courses of action and influence others to follow.	1.2.1.02 Leadership Measures - Average number of positions in local, state, and federal government held by students and/or former students (based on a student and/or former student survey). - Average number of offices in social, charitable, political, or civic organizations held by students and/or former students (based on a student and/or former student survey). - Students and/or former students participating in special social development programs; e.g., the Peace Corps and VISTA, (based on a student and/or former student survey).

OUTCOME VARIABLES	POTENTIAL MEASURES
	- Percentage of former students in management positions by the __th year following graduation (based on a former student survey). - Student and/or former student perceptions and evaluations of their leadership ability as determined by selected measures (e.g., AVL-Political; F-Scale).
1.2.1.03 Citizenship The ability to perform relative to the rights, duties, and privileges of a member of a community, state, or nation.	1.2.1.03 Citizenship Measures - Percentage of students and/or former students who voted in the last general election (based on a student and/or former student survey). - Average amount of monetary contributions per individual made to political, religious, and social organizations or special interest groups over past year relative to income category (based on a student and/or former student survey). - Student and/or former student perceptions and evaluations of their performance as citizens as determined by selected measures (e.g., KIT-Community Affairs Scale, National and State Politics Scale, and International and Intercultural Affairs Scale). - Average number of hours per month devoted to political, religious, and social organizations or special interest groups over the past year per student (based on a student and/or former student survey).

OUTCOME VARIABLES	POTENTIAL MEASURES
1.2.2.00 Social Attitudes, Values, and Beliefs	
1.2.2.01 Political Attitudes toward systems of government, including the processes, institutions, conventions, and the level of political participation.	1.2.2.01 Political Attitude Measures - Percentage of students and/or former students belonging to or holding office in political organizations (based on a student and/or former student survey). - Student and/or former student perceptions and evaluations of their political attitudes and beliefs as determined by selected measures (e.g., AVL-Political Scale; F-Scale; KIT-National and State Politics Scale, Community Affairs Scale, National Status and World Security Scale, Freedom of Expression Scale, Societal Viewpoints Scale). - Percentage of former students utilizing mechanisms of the political process; e.g., petitions circulated, hearings attended, letters written, lobbying activities (based on a former student survey).
1.2.2.02 Racial/Ethnic Attitudes toward races or national origins other than one's own.	1.2.2.02 Racial/Ethnic Attitude Measures - Student and/or former student perceptions and evaluations of their racial and ethnic attitudes and beliefs as determined by selected measures (e.g., KIT-Minority Problems Scale; E-Scale).

OUTCOME VARIABLES	POTENTIAL MEASURES
	- Number of students and/or former students who are partners in an interracial marriage as a percentage of survey sample (based on student and/or former student surveys). - Percentage of elected student offices held by members of ethnic minorities.
1.2.2.03 Personal Ethics Ethical and moral values that affect an individual's actions and thoughts toward others. The sense of what is right or wrong in one's conduct and motives in dealings between individuals and groups.	1.2.2.03 Personal Ethics Measures - Student and/or former student perceptions and evaluations about their ethical and moral values as determined by selected measures (e.g., AVL-Religious Scale and Social Scale; KIT-Feelings About Other People Scale). - Percentage of former students arrested on felony and misdemeanor charges during the last ____ years (based on former student survey).
1.2.2.04 Social Conscience The concern for human welfare. The importance placed on human interests, values, and conditions.	1.2.2.04 Social Conscience Measures Note: Many of the measures suggested in 1.2.1.01 Interpersonal Participation and 1.2.1.03 Citizenship also apply here. - Student and/or former student perceptions and evaluations about their concern for human welfare as determined by selected measures (e.g., AVL-Social Scale; KIT-Societal Viewpoints Scale, Human Relations Scale, Societal Priorities Scale; OPI-Social Maturity Scale; SAI-Humanism Scale).

OUTCOME VARIABLES	POTENTIAL MEASURES
1.2.2.05 Socioeconomic Aspirations The importance attached to one's socioeconomic status.	1.2.2.05 Socioeconomic Aspirations Measures - Average student and/or former student-reported score on scales measuring perceptions and evaluations of their current and desired social and economic level (based on a student and/or former student survey).
1.2.2.06 Cultural Interest The interest in and acquaintance with arts, manners, scholarly pursuits, and other qualities that characterize civilizations.	1.2.2.06 Cultural Interest Measures - Student and/or former student perceptions and evaluations of their interest in culture as determined by selected measures (e.g., KIT-Educational Benefits: Humanistic Scale). - Percentage of courses (credit and/or noncredit) taken that are classified as emphasizing cultural interests.

OUTCOME VARIABLES	POTENTIAL MEASURES
1.3.0 Personal Development	
1.3.1.00 Student Health	
1.3.1.01 Physical Health The physical well-being of students and/or former students.	1.3.1.01 Physical Health Measures - Percentage of students and/or former students reporting physical illnesses, by type of illness (based on a student and/or former student survey).
1.3.1.02 Mental Health The mental well-being of students and/or former students.	1.3.1.02 Mental Health Measures - Percentage of students and/or former students reporting mental illnesses, by type of illness (student and/or former student survey). - Percentage of students participating in special mental health counseling programs.
1.3.2.00 Student Personal Attitudes, Values, and Beliefs	
1.3.2.01 Religious and Spiritual Attitudes toward and adherence to the conventions, practices, and teachings of religious organizations or sects.	1.3.2.01 Religious and Spiritual Attitude Measures - Percentage of students and/or former students belonging to or holding office in religious organizations (based on a student and/or former student survey). - Student and/or former student perceptions and evaluations of their religious and spiritual attitudes and beliefs as determined by selected measures (e.g., AVL-Religious Scale; KIT-Religion Scale and General Values & Ideologies Scale; OPI-Religious Liberalism Scale; SAI-Reflectiveness Scale; T-CR). - Percentage of students regularly attending religious services.

OUTCOME VARIABLES	POTENTIAL MEASURES
	- Average monetary contribution per former student to religious organizations relative to income category (based on a former student survey).
1.3.2.02 Change/Stability Attitudes toward new and different ideas, relationships, products, or methods. The desire to introduce, avoid, or be associated with changes.	1.3.2.02 Change/Stability Attitude Measures - Student and/or former student perceptions and evaluations about their attitudes and beliefs toward new and different things as determined by selected measures (e.g., KIT-Areas and Agents of Change Scale, Involvement in Campus Reforms Scale; Rokeach Dogmatism Scale). - Average number of changes in employment per former student during the past ____ years (based on a former student survey).
1.3.2.03 Self-Concept The feeling and acceptance of one's self as having basic worth and value.	1.3.2.03 Self-Concept Measures - Student and/or former student perceptions about oneself as determined by selected measures (e.g., KIT-Feelings About Self Scale).

OUTCOME VARIABLES	POTENTIAL MEASURES
1.4.0 Career Development 1.4.1.00 Career Preparation 1.4.1.01 Academic Preparation The ability to seek, gain, and maintain a particular level and kind of academic pursuit.	1.4.1.01 Academic Preparation Measures - Average number of awards and citations received per graduate for academic performance (based on a former student survey). - Percentage of graduates working toward or receiving an advanced degree or certificate ____ years after graduation (based on a former student survey). - Percentage of graduates enrolled in graduate school ____ years after graduation (based on a former student survey). - Average student and/or former student-reported score on a scale measuring the degree of satisfaction with their academic performance (based on a student and/or former student survey). - Number of dropouts during the past year as a percentage of their academic rank or the total institution enrollment. - Number of students graduating from the institution after ____ years as a percentage of the entering class. - Number of graduates who transferred in as a percentage of total graduates for the year.

OUTCOME VARIABLES	POTENTIAL MEASURES
	- Percentage of students changing major (lower division, upper division, and/or graduate) during the past year.
1.4.1.02 Vocational Preparation The ability to seek, gain, and maintain a particular level and kind of employment.	1.4.1.02 Vocational Preparation Measures - Percentage of former students employed within ____ days after graduation (based on a former student survey). - Average first salary of former students (based on a former student survey). - Average income category for former students after ____ years (based on a former student survey). - Percentage of dropouts employed within ____ days after dropping out (based on a survey of dropouts). - Average score of dropouts on a scale measuring the degree of satisfaction with their vocational performance (based on a survey of dropouts). - Average number of professional awards and citations received by former students (based on a former student survey). - Percentage of former students in management positions by the ____ th year following graduation (based on a former student survey).

OUTCOME VARIABLES	POTENTIAL MEASURES
	- Average score reported by former students on a scale measuring satisfaction with their vocational performance (based on a former student survey). - Number of former students who desire to have their children follow the same career field as a percentage of the total number of former students surveyed (based on a former student survey). - Average number of voluntary/involuntary changes in employment over given time periods per former student (based on a former student survey). - Percentage of total graduates employed in-state versus out-of-state. - Average number of voluntary/involuntary changes in career field over given time periods per former student (based on a former student survey).
1.4.2.00 Career Attitudes, Values, and Beliefs	
1.4.2.01 Achievement Orientation The importance placed upon accomplishments; i.e., successfully completing work that is valued by the individual and/or society. Impact or benefit as viewed by the student and/or the larger society.	1.4.2.01 Achievement Orientation Measures - Student and/or graduate perceptions and evaluations of achievement as determined by selected measures (e.g., KIT-Feelings About the Future Scale).

OUTCOME VARIABLES	POTENTIAL MEASURES
1.4.2.02 Educational Aspirations The educational degree and/or competency level desired and valued by students and/or graduates.	1.4.2.02 Educational Aspirations Measures - Percentage of students identifying the ___ degree (none, associate, bachelor's, master's, doctoral, other) as the highest degree planned (based on a student survey). - Percentage of graduates working toward or receiving an advanced degree ___ years after graduation (based on a former student survey).
1.4.2.03 Educational Satisfaction The degree of student satisfaction with their educational experience.	1.4.2.03 Educational Satisfaction Measures - Percentage of former students who intend to send their children to the same school (based on a former student survey). - Average amount of alumni gifts ____ years after their graduation. - Average student- and/or former student-reported score on a scale measuring the degree of satisfaction with their educational experience (based on a student and/or former student survey).
1.4.2.04 Vocational Aspirations The level of attainment in a profession desired by students and/or graduates.	1.4.2.04 Vocational Aspirations Measures - Average first salary expectations of students (based on a student survey).

OUTCOME VARIABLES	POTENTIAL MEASURES
	- Percentage of students and/or former students seeking certain professional levels in society (based on a student and/or former student survey).
2.0 Development of New Knowledge and Art Forms*	
2.0.0.01 Discovery of New Knowledge The identification and development of new knowledge, theories, and products without regard to practical application.	2.0.0.01 Discovery of New Knowledge Measures - Average number of basic research publications per student, former student, and/or faculty member over a given time period (based on a student, former student, and/or faculty survey). - Average number of times a given basic research publication is cited in bibliographies of other authors over a given time period (e.g., based on publications listed in Science Citation Index). (Note: both frequency and the time interval over which citations are made should be considered.) - Average percentage of faculty time spent in selected basic research activities (e.g., NCHEMS Faculty Activity and Outcome Survey - Section B.1 Specific Research Projects). - Average number of proposals funded for the development of new ideas and products during _____ year(s). - Total dollar amount of gifts and/or grants received for the development of new ideas and products without concern for practicality as a percentage of total budget for ____ year(s).

*The current inventory does not contain variables and measures related to the development of New Art Forms.

OUTCOME VARIABLES	POTENTIAL MEASURES
2.0.0.02 Interpretation and Application of New Knowledge The development and use of new knowledge, theories, and products with regard to practical application.	2.0.0.02 Interpretation and Application of New Knowledge Measures - Average number of applied research, development, and evaluation publications per student, graduate, and/or faculty member (based on a student, former student and/or faculty survey). - Average percentage of time spent by faculty in selected applied research, development, and evaluation activities (based on NCHEMS Faculty Activity and Outcome Survey - B.1 Special Research Projects, E.2 Professional Service and Advice, and F.1 Academic Activity Outside the Institution). - Average number of awards and citations received per student, former student, and/or faculty member for applied research, development, and evaluation efforts (based on a student, former student and/or faculty survey). - Average number of applied research, development, and evaluation proposals funded during past ___ year(s). - Total dollar amount of gifts, contracts, or grants received for applied research, development, and evaluation as a percentage of total budget for ___ year(s).

OUTCOME VARIABLES	POTENTIAL MEASURES
2.0.0.03 Reorganization of New Knowledge The synthesis of existing theories, findings, and statements in order to present existing knowledge in a new form designed to be more readily comprehensible or usable (e.g., new textbooks, written articles, and oral communications).	- Average number of patents and/or copyrights received per student, former student, and/or faculty member over a given time period (based on a student, former student and/or faculty survey). 2.0.0.03 Reorganization of New Knowledge Measures - Average number of textbooks, monographs, etc., published per faculty member (based on a faculty survey). - Average percentage of faculty time spent in reorganizing existing knowledge (based on NCHEMS Faculty Activity and Outcome Survey - Section A.4 Course and Curriculum Development). - Average number of films, taped lectures, etc., developed per faculty member (based on a faculty survey).

OUTCOME VARIABLES	POTENTIAL MEASURES
3.0 Community Development and Service	
3.1.0 Community Development	
3.1.0.01 Community Educational Development The growth and development of members of the community who are not working toward a degree or certification, but who are taking advantage of continuing education opportunities offered.	3.1.0.01 Community Educational Development Measures - Note: Measures listed in 1.1.1.01 General Knowledge, 1.1.1.02 Specialized Knowledge, 1.1.2.01 Application of Knowledge, 1.1.2.02 Critical Thinking and Reasoning Skills, and 1.1.2.03 Creativity can also be utilized as indicators of Community Educational Development. - Percentage of students in various instructional programs who are classified as nonmatriculating.
3.1.0.02 Faculty/Staff Educational Development The growth and development of faculty and staff either through their instruction, research, or management activities or through the continuing education opportunities offered.	3.1.0.02 Faculty/Staff Educational Development Measures - Percentage of faculty/staff who are taking courses in the institution. - Percentage of faculty time spent in selected activities (based on NCHEMS Faculty Activity and Outcome Survey - B.2 General Scholarship and Creative Work, F.1 Academic Activity Outside the Institution). - Faculty and staff perceptions and evaluations of their educational growth and development (based on a faculty/staff survey).

OUTCOME VARIABLES	POTENTIAL MEASURES
3.2.0 Community Service 3.2.0.01 Extension Services The extent to which the community receives direct assistance and services of various types from the primary programs of the institution (e.g., agriculture extension service, other noninstructional extension activities, faculty/staff consulting).	3.2.0.01 Extension Services Measures - Average percentage of faculty time spent in selected activities (based on NCHEMS Faculty Activity and Outcome Survey - E.2 Professional Service and Advice, F.1 Academic Activity Outside the Institution, F.2 Paid Professional Service). - Estimated replacement value of specific extension services received by individuals or organizations that receive the services. - Ratio of total income for extension services to total budget for extension services. - Income produced through extension services, as a percentage of the cost of offering the service(s). - Amount of release time granted faculty members per year for community service.

OUTCOME VARIABLES	POTENTIAL MEASURES
3.2.0.02 Personal Services The extent to which individuals in the community receive direct personal services of various types through the support programs and facilities of the institution (e.g., medical clinics that serve the general community, nursery schools, access to the library, and computer center).	3.2.0.02 Personal Services Measures - Number of individuals not associated with the institution who were served by a particular institutional support program (e.g., the computing center, the library, etc.) as a percentage of the total number of individuals served over a given time period. - Estimated monetary value of specific personal services offered relative to other comparable services offered elsewhere.
3.2.0.03 Extramural Cultural and Recreational Services The availability and utilization of the recreational and cultural opportunities offered through the institution to the community (e.g., sporting events, the performing arts, museum exhibits, and concerts).	3.2.0.03 Extramural Cultural and Recreational Services Measures - Estimated number of nonstudents, nonfaculty, and nonstaff attending selected extramural events as a percentage of the total number attending.

OUTCOME VARIABLES	POTENTIAL MEASURES
3.2.0.04 Financial Impact on the Community The economic benefits or costs directly and indirectly accruing to the community as a result of the operation of the institution including such elements as: 1) purchases of goods and services by the institution, its students, and its faculty; 2) students available as employees; 3) drawing power of the community for industry and as a place of residence for employees.	3.2.0.04 Financial Impact on the Community Measures - Total dollar amount of goods and services purchased by the institution from a particular sector of the community during the past year. - Estimated average dollar amount of expenditures by students in the community. - Number of students employed in businesses, agencies, and organizations in the community as a percentage of the total student enrollment (based on student survey). - Total dollar amount of the institution's payroll as a percentage of the estimated total community payroll.

OUTCOME VARIABLES	POTENTIAL MEASURES
3.3.0 Longer Term Community Effects	
3.3.0.01 Social Impact The long-term social effects of the institution, primarily through its former students, on the community of the institution.	3.3.0.01 Social Impact Measures Note: Many of the measures listed in Section 1.2.0 Social Development and 1.3.0 Personal Development can be applied equally well over long time periods and also to children of former students if attempts are made to identify intergenerational effects.
3.3.0.02 Economic Impact The long-term economic effect of the institution, primarily through its former students, on the community.	3.3.0.02 Economic Impact Measures Note: Many measures listed in Sections 1.2.2.05 Socioeconomic Aspirations, 1.4.1.02 Vocational Preparation, 1.4.2.04 Vocational Aspirations, and the research-oriented outcome indicators in Section 2.0 Development of New Knowledge and Art Forms can be applied equally well over long time periods.

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